THE SOURCES AND GROWTH OF ARCHITECTURE IN EGYPT.

By Professor W. M. Flinders Petrie, D.C.L.

Read before the Royal Institute of British Architects, Monday, 20th May 1901.

PROBABLY no subject of history or art has made a greater advance in the last few years than Egyptology, in our knowledge of the rise of the civilisation. The reason is very simple. For a lifetime past the country had been a close preserve in which no independent work was allowed; but the first year that we won our way into Upper Egypt we fixed the Mykenæan Greeks to 1450 B.C.; the second year produced the archaic statues of gods of the beginning of history; the third year revealed the whole prehistoric civilisation. Each year since has given fuller results, until now we know more details of the origins of the arts in Egypt than in any other land.

In no respect is our view more enlarged than in the architecture. Ten years ago we were starting with the most highly-finished work of the Fourth Dynasty, the great pyramid of Khufu, and were groping in the dark for any clues to the growth of such surpassing construction. To-day we can show how every feature arose, and we can date to a single generation the adoption of stone for building.

I propose first to notice the use of unwrought materials, and the forms which result from such; then the use of wrought wood; of stone, rough and wrought; and lastly, the development of pillars.

The unwrought materials, which were everywhere to hand in Egypt, were palm-ribs, papyrus, reeds, maize stalks, and mud, together with palm-fibre roughly twisted. At the present day a native sets up a row of maize stalks for a fence, binding them by weaving some stalks in and out in opposite directions along the upper part. Needing a closer line for shelter, he places the stalks touching, and lashes on some cross stalks by means of palm string. This stage is seen in an enclosure in a scene on the great mace head of Narmer (4800 B.C.). To keep out the wind this wall of stalks is plastered with mud, and so a hut is formed.

A striking sight of the beginnings may be seen any day in a nomad settlement on the desert edge. Side by side stand (1) a black goat-hair Arab tent, long and low, open always on the leeward side; (2) a tent fenced along part of the open side with a row of maize stalks; (3) a tent fenced all round with maize; (4) a tent in a maize fence mud-plastered; (5) a dwarf wall of brick round the fence; (6) a high brick enclosure with a tent inside to roof it, the tent ropes stretching out through the wall; lastly, a roof is put on the wall, and the tent has disappeared.

The early Egyptians seem, however, to have usually roofed their reed huts with domed roofs, to judge by the engraving of a hut on ivory, at the rise of the First Dynasty (4800 B.C.),

where the upright sides, doorway, and hemispherical roof are well shown [fig. 1]. The construction of the roof is probably preserved to us in the Bisharin tents at Aswan, where palm-ribs form the curved framework, covered by palm-leaf mats. That such mats were familiar in early construction is shown by the impressions in mud plaster at the roofs of the royal tombs, as we shall notice below.

FIG. 1. REED HUTS.

The next feature is the strengthening of the corners of the hut, by placing at each angle a bundle of reeds lashed together, as seen in the hut on the mace of Narmer. Here we have the origin of the torus-roll down the edges of the buildings, used till the latest stage of the architecture. The lashing together was always retained as an ornament, although the meaning of the roll was long lost. Here, then, the reed hut is essential to understand even the most decadent architecture.

When papyrus stems were used for walling, instead of reeds or maize stalks, the top was rather weak if stripped of its leaves; hence they were retained and bound together, and the feathery tops served as a barrier above the wall, and finally as an ornament. Supposing a hut framed thus of papyrus, with roofing of papyrus stems, lashed into the heart of the leafage on each stem, we should have a wall such as is here shown. This was actually used for the light cabins of boats, as we see on some scenes at Saqqara in the Fourth Dynasty [fig. 2]. From the size of these cabins they must be very light to be placed thus on a papyrus boat, and the top ornament can have been nothing very solid or heavy. Then this decoration was transferred to wall surfaces, along the top of which it commonly appears, usually striped in light and dark green.

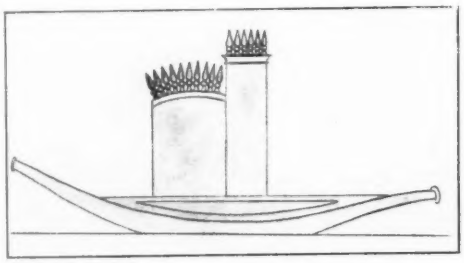

FIG. 2. PAPYRUS CABINS AND BOAT.

Besides these materials, palm-ribs may be seen still used for fences. They are set upright with all the leaves on them, at a few inches apart, and strengthened by other ribs interwoven diagonally each way; just below the weak part of the tip a line of ribs is lashed on with palm-fibre, and the loose nodding tips serve as an effectual barrier to men and animals. The whole is finally plastered with mud up to the top lashing, and forms a very strong fence, which will last for many years. Such a fence or wall shown in the diagram [fig. 3] is figured as the front of an early shrine hieroglyph in the Fourth Dynasty, where the diagonal cross ribs, the tie roll near the top, and the loose tips forming the cornice may all be seen.

Translated into stone, this became the constant feature of every Egyptian building, and this cornice retained to late times the palm-leaf ribbing which proclaimed its origin. Not only was the external pattern retained, but the structural nature of the cornice was observed even in Roman times. The flat roof behind it was originally, of course, at the level of the lashing, below the loose drooping tops; and the stone roof is always kept to the level of the base of the cornice, which stands as a parapet around the roof. This cornice has travelled far, and survives still in our modern furniture.

We have preserved to us some views of simple shrines made of the natural materials, similar to the huts of maize stalks still used by the peasant [fig. 4]. In this simple hut we note the roof sloping backward, and carried on far before the open front, so as to cast a shade, while it is supported on two front pillars of stalks. This was the original type of the rustic shrine adopted as a hieroglyph, and preserved to us from the Fourth Dynasty. The front has the reed pillars carried up higher; the projecting roof is shown by the ends of the roofing sticks, and a low fence of sticks, lashed together, defended the sacred place from intrusion by animals. This figure survived in the writing for three thousand years, but was corrupted by drawing a doorway in the side of it. Other sacred enclosures and shrines are figured on the early tablets, such as the ebony tablet of King Mena.

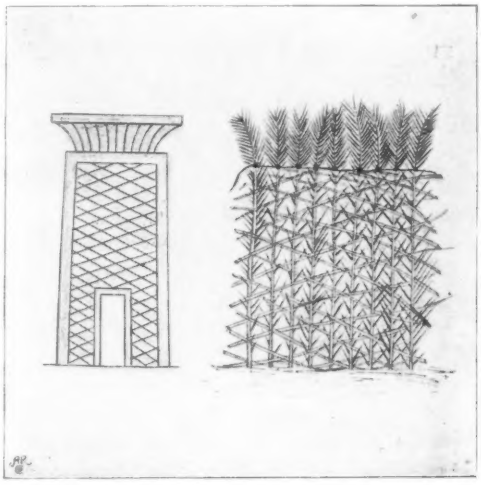

FIG. 3. PALM-RIB FENCE AND EARLY SHRINE.

Not a single point that I have here described was known ten years ago, and as more than half the illustrations are quite new to the subject, I have here recapitulated what has been gradually discovered in late years.

The next material to be noticed is mud-brick, one stage beyond the rough mud plastering The Nile soil naturally dries in the early summer until wide cracks, running many feet deep in the ground, are formed in all directions in the fields. The roughly cubic masses of black clay break loose, and are commonly lifted out and built into temporary walls and boundaries. Here natural bricks are before us, and the drying of the mud in uniform blocks on the surface is not a great or difficult step forward into brickmaking. Brick houses and town walls remain from the prehistoric age, probably about 6000 B.C.; and a model of a town wall, with watchmen looking over it, belongs to a rather earlier time. Possibly the latter might be copied from a piled mud wall, for at the present walls are often built of mud, laying a few inches every three or four days, sometimes steadying the whole by palm-ribs in the heart of the mass.

FIG. 4. MODERN HUT, LIKE EARLY HIEROGLYPH.

Regular brickwork developed in use in the prehistoric time, and some arched brick tombs are probably of this age. There can, however, be no doubt of the barrel-vaulted passage [fig. 5] in the tomb of King Neter-khet (found this year) belonging to the beginning of the Third Dynasty (about 4200 B.C.), and the magnificent brickwork and arching of the Sixth Dynasty (about 3400 B.C.) shows a long familiarity and free use of it.

FIG. 5. EARLIEST DATED ARCH. SECOND DYNASTY.

The stability of crude brick is aided by the external batter of the wall, which was generally adopted. In order to build this the easier, the bed of the wall was curved, so that all the quasi-horizontal lines were spheric coats around a point high up, to which the wall faces converged. This batter of the brickwork is continued in all the subsequent stone work, and it became in later times a great source of weakness when inclined walls of pylons were filled with mere chip stuff, as in the pylons of Karnak.

An inexplicable use of this batter was in building town walls. Such are often described as "wavy," but the method was to build blocks of brickwork about equal in each dimension: each face of the block had a batter, and the bed of the courses was curved. Then the spaces between the blocks, each about equal to a block, were filled with horizontal courses. Thus the wall when complete was in alternate sections, horizontal and saucer-shaped.

Coming now to wrought materials, wood was the earliest in use for construction. The prehistoric graves were often lined with matting, and this was, in the later prehistoric, sometimes supplanted by a wooden lining. The wood first came into use as a tray or bier, on which the body was placed, and which filled the floor of the grave. In some of the later prehistoric graves, and constantly in the royal tombs of the First Dynasty, we see that a lining of wooden boards covered the sides, and the drawing of this is fortunately preserved as a wall decoration painted round the lower part of the tomb of Merab, son of King Khufu (3950 B.C.) [fig. 6].

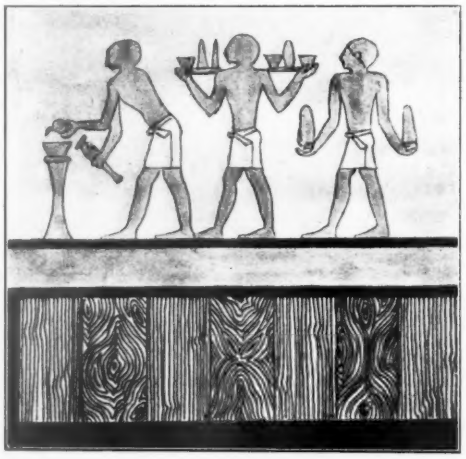

FIG. 6. WOODEN LINING PAINTED.

In the royal tombs at Abydos (4700-4500 B.C.) all of the wooden sides have been destroyed; but the evidences remain most clearly on the cross walls that were built to form cells around the wooden chamber, for the offerings. These walls are plastered and white-

washed on the sides, but the ends are all rough brick, evidently built against a pre-existing timber wall, as the mud mortar has taken the cast of the grain of the wood wherever it touched it. The timber chamber varied in arrangement with the brickwork, sometimes having brick cells around it, sometimes a brick wall built close to it. The foot of the side boards rested on a beam about 10 inches square, with one edge rabbeted out to receive the foot of the boards and the ends of the floor planks.

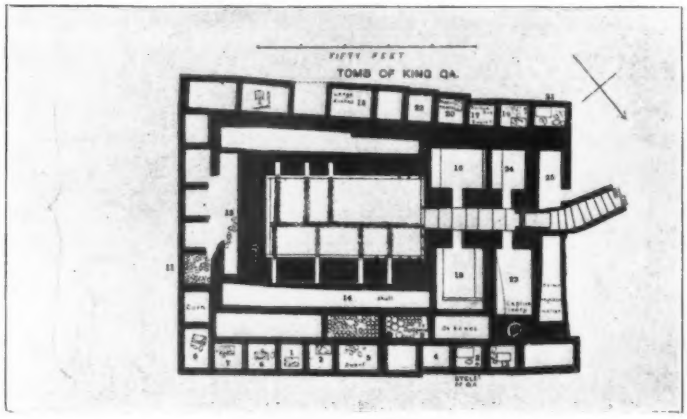

FIG. 7.

The floors of the royal tombs were usually of wood: one of the most complete shows the boards about 2 inches thick, resting on beams at the sides and down the axis of the chamber. The roofing of these tombs was also of wood, as in some cases the casts of the rough-hewn ends of the roofing beams remain in the brick walls of the chamber. In the tomb of King Qa the beam holes are not opposite to each other, proving that the beams did not run across, but rested on a main beam; and the place of this was not in the axis, as there is a post-stump in the ground, in line with one side of the doorway, and the beam holes are longer on one side than on the other. The holes in the wall are so long that it is hardly to be expected that single beams would reach the whole way, as the chamber is 19 feet wide. The longer beams seen on the floors are $17\frac{1}{2}$ feet.

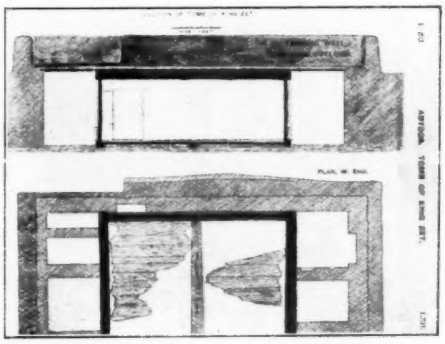

FIG. 8. TOMB OF ZET. FIRST DYNASTY.

The tomb of King Zet (4600 B.C.) is the one which demands most in the roofing, as it is 20 feet between the cell walls; and there is no trace of a support in the middle, although the floor is preserved in part. The tomb of Zer (4650 B.C.), his predecessor, is wider, being about 28 feet across, but it has been so altered in later time that there is no proof of its having been covered in one span. Taking the tomb of Zet, with 20 feet span, and supposing the beams 10 inches deep, as on the floor, they would bear a uniform load of 33 feet depth of sand. As they may very likely have been spaced about two of space to one of beam, they would carry 11 feet of sand. Now there is a dwarf wall of mud-brick around the tomb; smooth plastered on the outside, but left quite irregular inside; this was evidently a retaining wall for a cap of sand over the roof. As it is $3\frac{1}{2}$ feet deep, it shows that the beams, spaced as I have suggested, would be carrying one-third of their breaking load. This roofing, therefore, is quite practical. The mode of keeping the sand out was by spreading mats of plaited palm leaf, of which the

cast remains in the mud-mortar on the tops of the walls; as also the cast of straw, which seems to have been laid on. If the beams were spaced, of course a board roof must have been put between them and the mats. This system is the continuation of the roofing of the prehistoric tombs, which were covered in with poles 9 to 12 inches apart, and a thick coat of brushwood and fibre laid over them, to carry a thin coat of sand.

All this may seem distant from architecture: but it is the forerunner of the greatest architecture of the Pyramids. For the wooden chamber we find a stone chamber substituted, and the beams of the roof are of limestone or granite in place of wood. But the continuity of the general form and system is unbroken. The earliest royal tombs are plain pits roofed in, as in the prehistoric time. By 4650 B.C. a wooden lining forms a complete chamber, with brick cells around it, but no entrance. Under Den-Setui, 4600 B.C., an entrance stairway is added on the east side. Under Qa, 4500 B.C., the stairway is turned to the north. And the steps from this to the usual pyramid form of a north entrance passage sloping down to a chamber is merely a change of material, but not of form or position. The external form of the mastaba tomb, from which the pyramid was developed (or rather *on* which the pyramid was superveloped), is exactly that of the rectangular mass of sand above the tomb, held in by the retaining wall of mud-brick, with a large external batter, as over this tomb of King Zet.

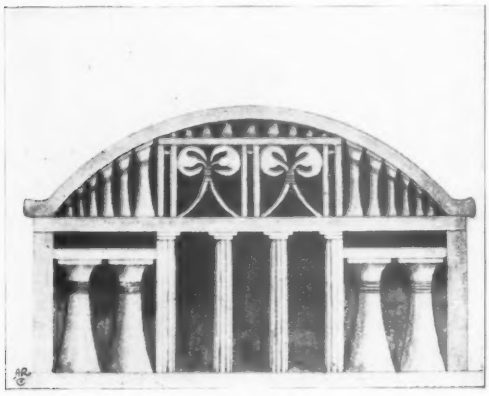

FIG. 9. IVORY MODEL OF HOUSE FRONT.

Before we pass from wood we must notice the favourite lattice-work, which has always perished, but which was copied so frequently in stone that it is very familiar to us. This was doubtless the decoration of the dwellings in the Nile plain, from which were probably also copied the flooring and the roofing which we have just described. This open work was the analogue of the modern mushrabiyeh work of Cairo; and it was prettily copied in ivory for a toilet casket of which fragments remain at Paris, from which a restoration, such as here shown, is tolerably certain [fig. 9].

Stone-working must now be traced. No instance of building-stone is seen in the royal tombs of the first six kings yet known (4900–4600 B.C.). In the reign of Zer (4700 B.C.), limestone was hewn and carved for the royal tombstone, and roughly hammer-dressed for private tombstones. His successor, Zet, had a beautifully carved tombstone, but yet no trace of building-stone. Then comes one of the surprises of workmanship, in the reign of the magnificent and sumptuous King Den, who floored the whole of his tomb [fig. 10] with slabs of pink and grey granite. Yet, strangely, this was apparently not intended to be seen, as a layer of mud-bricks was placed over it. After this splendid freak, not a trace of building-stone is found, and the general quality of work decayed in this First Dynasty.

The general appearance of this, one of the greatest royal tombs, is very naïvely shown on an ivory tablet, which records "the great chiefs come to the tomb, he gives satisfaction." The figure of the tomb shows at the left the tomb-chamber heaped over with sand; before it a tall upright object, perhaps the two great tombstones which stood at the chapel of each tomb; then a slope representing the stairway down into the tomb; and then an enclosure with rows of little objects, which is the square of graves of domestics round the king's tomb, each with a tombstone standing over it.

The first actual building of stone is the pit-chamber of King Khasekhemui, in the middle of the Second Dynasty, about 4350 B.C. [fig. 11]. The limestone courses are tolerably regular, varying one or two inches either way. The faces of the blocks follow natural cleavages as far as possible; but most of the faces are hammer-dressed, and then adzed over to level them. The adze used had a short handle, and was probably a flint tool, by the nature of the breaks on its edge [fig. 12]. The stone was quite freshly quarried when used, as the adze has dragged the face in dressing it. The joints have plaster in them, and also spread over the open joints on the face. The whole chamber is 10 by 6 cubits, or rather over 17 by 10 feet, and nearly 6 feet deep. The courses average nearly a foot each. Such is the oldest piece of stone building that can be dated.

FIG. 10. EARLIEST GRANITE PAVING. FIRST DYNASTY.

The same king also worked in grey granite, as two large building-blocks with inscriptions of his have been found at Hierakonpolis and at El Kab. But we may reasonably suppose that building in limestone was still rare, when we see none in the preceding royal tomb of Perabsen, and only the sepulchral chamber built of stone in this tomb, all the dozens of chambers for offerings around it being entirely of brick. And we have the record in Manetho that the second king of the next dynasty, about a hundred and fifty years later, built a house of hewn stone.

FIG. 11. EARLIEST STONE BUILDING. SECOND DYNASTY.

It is probably, therefore, to the latter half of the Second Dynasty, about 4350–4200 B.C., that a series of rough stone pyramids must be assigned which stand at El Amrah, Nubt, and El Qula. These are all built of unhewn blocks found loose on the desert and cliffs. Each has successive faces of external finish, which have been coated over with added masonry. At Nubt the faces are still undressed,

merely being selected for their flat fractures. At El Amrah the faces are moderately dressed. All of these are, however, built at the mastaba angle of four rise on one of base, and have never had their successive coats covered with one uniform casing, like a pyramid. The chamber at Nubt was a mere hole in the soft sand.

Apparently later than these is the fine tomb of King Neter-khet, who was probably the second king of the Third Dynasty, about 4200 B.C. The external body of the tomb is a mass of brickwork 30 feet high; in this has recently been discovered a long passage with four stone portcullises, descending 80 feet to a series of eighteen chambers, some of which are built of stone, well wrought. This is probably the tomb of the same king who is recorded to have built a house of hewn stone; and it would well accord with the level of work when stone began to be used in place of the slighter constructions, at a long distance from the quarries.

FIG. 12. EARLIEST STONE DRESSING. SECOND DYNASTY.

Of probably the same date is the great stone pyramid of Saqqara, which was built as a mastaba tomb of stone, like the above brick tomb, and then successively enlarged by repeated coats of masonry, until it had six steps externally. Each coat was faced with finely-hewn stone closely jointed, which can still be seen in the mass of it. Such a structure, however it may approximate to a pyramidal outline, is not a true pyramid but an aggrandised mastaba tomb, derived originally from the battered retaining wall of mud-brick placed around the sand bed which covered the roof of the royal tombs.

The same is true of the last of such tombs, that of King Seneferu at Medum (4000 B.C.), where the eight steps of the original mass were finally coated over with one smooth casing from base to top, thus creating for the first time a pyramid, a form which was copied during some seven centuries, and had much influence on forms in later ages. The first true pyramid, that of Khufu, being the fully perfected type, we only glance at now as a reminder.

It is important to see clearly how the pyramid structure is derived from the wooden tombs in unbroken succession, as it has by some been derived from the dolmen and chambered barrow. These structures are quite unknown in Egypt; whereas we have traced the continuous stages between the prehistoric pit-grave and the greatest and most accurate structure ever built. Even the preparation for a pyramid remained just the same as for the wooden tombs of the First Dynasty. First we see the pit of the tomb of Den made for a wooden chamber, with its long sloping entrance; next we see the similar pit with sloping entrance cut in the rock at Abu Roash, for a stone pyramid of the Fourth Dynasty, now destroyed.

Lastly, we may notice the subject of pillars; but, as I have elsewhere stated the facts

known, they are just summarised here. Columns of maize stalks bound together are commonly used in huts at present; and stalks bound and plastered with mud are the usual supports of the heavy swinging shadufs used for raising water. Hence we can understand one early form of column which shows the splaying base needful to prevent crushing, and the spread top, bound round for some way down.

The wooden column appears as an octagon in the models found in the First Dynasty, and in the actual pieces which I have found in the Twelfth Dynasty, and the copies of such in stone at Beni Hasan.

The fluted wooden column is found copied in ivory in the First Dynasty tombs, and is well figured as a hieroglyph in the Fourth Dynasty.

The most peculiar form of column is that derived from the tent-pole, as figured in the hieroglyphs. This was the origin of the strange form known as the inverted bell capital in the Eighteenth Dynasty at Karnak.

The lotus column has been well discussed by M. Foucart, whose work I had the pleasure of bringing to your notice recently.* The earliest example known is of the Fifth Dynasty (about 3600 B.C.), and shows the stems of papyrus bound together, and then decorated with lotus flowers and buds. The later examples of the Twelfth Dynasty, of the Eighteenth Dynasty, and of the Nineteenth and Twentieth Dynasties, show only a series of lamentable decadence. Each age in Egypt had its special excellence. In the Eighteenth Dynasty a delicate and freely flowing ornamental treatment; in the Fifth Dynasty the finest figure sculpture; in the Fourth Dynasty the grandest constructions; and in the First Dynasty the most lavish use of hard stones for hand objects and table furniture. Diorite, porphyry, and such materials were cut in thin and beautiful forms with a familiarity which was never known in later times. But every branch of art, when once it had fully grown, decayed rapidly, and the later work in every respect cannot bear comparison with the older triumphs.

I have now briefly shown how the elements of Egyptian construction arose, and how we can at last understand the history of a style which lasted even down to the age of Constantine in the White Monastery at Sohag, a duration of five thousand years.

DISCUSSION OF PROFESSOR FLINDERS PETRIE'S PAPER.

The President, Mr. WILLIAM EMERSON, in the Chair.

PROFESSOR AITCHISON, R.A., *Past President:* I should like to propose a cordial vote of thanks to Professor Flinders Petrie for his most interesting Paper. For many years I have followed Professor Petrie's discoveries at a respectful distance, and when he first showed us some of the treasures he had found, I introduced myself to him, and he showed me some of the principal ones—a portion of the "Iliad" in Greek, beautifully written, and some most interesting children's toys; and on another occasion some beautiful bas-reliefs. I am unfortunately not an Egyptologist, for when I began to study my profession I thought it was too remote, but now we see that that acme of perfection, the Doric of the Greeks, was Egyptian too, and that a true wagon-headed vault was Egyptian; and though Professor Petrie has not told us its date, it makes it possible that the original Cloaca Maxima at Rome may have been vaulted, although I have always believed it was originally roofed with slabs of stone, for hitherto we have believed the arch to have been invented in the days of Alexander the Great, some 300 years after Tarquinius Priscus. The Egyptians had shown the way of making ornament out of every common thing, even out of so ghastly a subject as decapitated men. Professor Petrie's charming description of the wattle and dab of the Egyptians was most fascinating, and the growth of an imposing stone architecture from it showed an invention that was truly marvellous. I am sure you will show your appreciation of the interest of his

* JOURNAL R.I.B.A., Vol. IV., 3rd series, p. 361.

lecture by your acclamation when the last speaker has concluded.

SIR LAWRENCE ALMA-TADEMA, R.A. [*Hon. Fellow*], in seconding the vote of thanks, said that people were apt to believe that Egyptian architecture, like Egyptian civilisation, had come full-grown into the world. For a long period the question of the development of Egyptian civilisation had remained unsolved, and we were now indebted to Professor Petrie for the history of that civilisation to which the world owed so much, since we had inherited the outcome of it through Judaism, Greek architecture, and numerous other sources. Through the labours of Professor Petrie we were at last able to comprehend how that art and that civilisation developed. Another important point was the question of chronology. We look back upon 6,000 years as carrying us almost beyond the reach of humanity. But did we ever think that 6,000 years, after all, was only one hundred generations of sixty? If that fact were borne in mind, we should feel with Professor Petrie that the Egyptians of those far-away days were very much akin to present-day peoples. That civilisation, which was so essentially human in its development, had passed, like all expressions of human thought, through those phases of decay which fructify the germs of future developments. We had to thank Professor Petrie for so many things already; and that evening we had to thank him for having lifted up a corner of the mystery that enshrouded that great race, that great civilisation, that great power of human development, which was, although a thing past and gone, still living amongst us.

SIR W. MARTIN CONWAY said he could only re-echo previous speakers in praise of the Paper just read to them and the immense amount of suggestiveness it contained. As he watched the slides and listened to the Paper, it occurred to him how very strong an illustration the subject was of a fact which might be observed throughout the whole history of Architecture—viz. how frequently new architectural styles had risen from the translation into one material of forms devised for another. It was one of the axioms of Ruskin that nobody should ever imitate in one material decorations which were proper to another. But in the history of architecture new architectural styles seemed always to have been developed by doing that exact thing. All the decorative forms in the earliest stone architecture were found to be derived by direct imitation from the older structural forms which were developed when buildings were not made of stone. The same thing occurred in Greece, where stone architecture arose by the imitation of the forms devised for wooden architecture. Exactly the same thing is taking place to-day, now that metal construction is coming in and is about to become the predominant constructive feature in the world's architecture. The architectural forms of the great metal-framed buildings of the present day are all imitations of those forms which were devised as decoration, or even as structural features, of buildings in stone or brick. He could only say in conclusion how fortunate we are to have in Egypt a representative of this country capable not merely of making such admirable investigations, and bringing to bear on the newly-opened soil such a bright and intelligent and quickly apprehensive eye, but also a man of science and of art, who was able not merely to see and collect and gather together materials, but almost immediately to reveal their significance to his countrymen at home. Professor Petrie did not, as so many investigators do, keep his treasures in his pocket for years and years, and slowly dribble them out in monographs that nobody saw; but he came home, and, within a few months, placed the world in possession of at all events the first gleanings of the discoveries which, not fortune alone, but his ability had enabled him to make.

DR. ALEX. S. MURRAY [*F.*] said it was perhaps hardly fair to Professor Petrie, after he had given them so much of his best in his most admirable Paper, to ask him a question about those columns shown them on the screen, which always narrowed towards the top. It would be remembered that the oldest Greek columns, as on the Lion Gate at Mycenæ, and on the frescoes found by Mr. Evans in Crete, were wider towards the top, and he would like to have heard from Professor Petrie whether he had formed an opinion on the subject. Again, Professor Petrie's reference to those primitive buildings of maize bound together, as if the people built their homes just where they happened to find something that would shelter them, reminded him of a passage in the "Odyssey," where Ulysses describes how he built the bridal chamber for Penelope. He said there was an olive tree growing in the courtyard of the house, and he built a stone wall round it and roofed it in. The commentators, as usual, were rather obscure on the point. He did not know whether Professor Petrie had thought of this matter of the "Odyssey," but if a living tree growing in a court was adopted by Ulysses as the supporting element for the chamber he built, it would be something analogous to the practice referred to by Professor Petrie of using natural objects like maize and so on to build a house.

MR. R. PHENÉ SPIERS, F.S.A. [*F.*] said there were two or three points he should like to refer to in connection with the subject. As regards those masses of brickwork in curved form,—was there any truth in the theory that this curved form was to prevent their being shaken down by earthquake? With all the masses leaning towards one another in the centre, the shaking of the ground would have less effect than on a vertical wall. If that was the case, the building of blocks

of bricks at intervals with these curved lines would give very strong points of support, and the intermediate walls would tie them together to make the wall enclosing the fortress. Another point he wished to refer to was the covering over of that chamber where the room was 20 feet span. Twenty feet was a very long dimension; and the Professor had said afterwards that no timber longer than 17 feet had been found. At the same time there was no doubt that it was the custom to cover over the tombs with timber, because there were a number of tombs round about the Pyramids in which these roofs were carved in stone in imitation of earlier structures. So that the covering over of houses or tombs in earlier periods with timber must certainly have been a well-known and recognised custom. Could Professor Petrie tell them what kind of wood was used? With the exception of the palm tree, which was not a very strong wood when laid horizontally, it was difficult to understand how such a great dimension as 20 feet was spanned over by timber, especially if it had to carry such a weight as that stated in the Paper. As regards another point—viz. the true formation of the openings of the doorways—in almost every guide-book of the country it was stated that the doorways in Egypt were always wider at the bottom than at the top. If built with timber or stone the sides could be inclined somewhat more forward, as was the case with Greek work; but, building with crude brick, it would be impossible; the wall would fall over. It never seemed to be recognised that, as a matter of fact, the sides of the doors of Egyptian buildings were always vertical. If Professor Petrie could insist upon the fact that they were always vertical he would remove an error that was repeatedly made in their guide-books. Might he ask whether the fluting of the column shown in ivory was hollow?

PROFESSOR PETRIE: Yes, hollow, both in the hieroglyph and in the ivory.

MR. PHENÉ SPIERS: Because all the columns at Beni-Hasan are flat-sided, are they not?

PROFESSOR PETRIE: They are both flat-sided and curved.

MR. HUGH STANNUS [*F.*] said he would like to add his thanks to Professor Petrie for the delightful Paper he had read, so full of knowledge, and so new in its knowledge to all of them. Looking back on the authors who had written on Egyptian subjects, one could see a certain analogy between the Egyptian remains and the various crusts of the earth. When man in his savage state began to make use of the crust of the earth, he could only deal with the tertiary parts—the clay and the sand. Later, as he advanced in civilisation, he was able to deal with the stone and the coal—in the secondary strata. Later still, when he was further advanced, he was able to deal with the metals in the primary strata. So with the strata of the Egyptian discoveries. Reading the old books of the time of Denon and Belzoni, it would be seen that their chief idea of Egyptian art was that of the Eighteenth and Nineteenth Dynasties, which were in a state of effete degradation and debasement; and that was thought to be Egyptian art. Then there came a time when men were able to go further back than that, and get to the art of the great Amenem-hat, of the Twelfth Dynasty. Since then men had been able to get to the art of the pyramid builders. Going further back, down to the primary stratum, Professor Petrie had taken them to the art of the First Dynasty, and to the art of dynasties even before the "first" one. While they of the present day might congratulate themselves that they lived in such a time, to have had all this laid bare so clearly to demonstration as had been done that evening, and while they could congratulate Professor Petrie on having in the fulness of time come to do that, he thought there might be occasion for some condolence with him that there would be no more worlds left for him to conquer. Professor Petrie had struck the bedrock in Egyptian matters, and in the next two or three years, all being well, one might hope to see it so clearly laid bare that unless another vein was found his occupation would be gone—so far as Egyptian excavation was concerned. But in view of the delightfully clear and lucid manner in which he had shown these things, there was a great future in explaining them, and they might congratulate themselves that they were born in this time to take advantage of it. A previous speaker had spoken about Professor Petrie finding things in virgin soil. He had heard Professor Petrie say that it was by no means virgin soil; that all this ground had been well picked and hacked about before he had a chance of going over it; and the marvellous things he had discovered must show the difference between a man excavating ground for the purpose of finding curiosities which could be carted away to a museum, and the man examining the site with eyes and knowledge to look for the evidences of the past civilisations. It was another instance of the application of the old story of "Eyes and No Eyes, or the Power of Seeing" that one read as a child.

THE PRESIDENT, in putting the vote of thanks, said he was sure they all felt, as he did, the very greatest gratitude to Professor Petrie for giving them such a splendid testimony of his research and careful discrimination in working out the origin of Egyptian architecture. To those who had not followed the later phases of the discoveries in Egypt, the Paper read that evening was a revelation. He had often, when looking at the Egyptian column, wondered where and how its form originated. But the Paper made it clear

that the art of Egypt was indigenous there, and grew up in the country. That upset the notion of earlier years, that the art of Egypt suddenly appeared there full blown, which to his mind was always an added charm to the mystery that attached to Egypt. Only as recently as ten years ago people were talking of travelling in Arabia and other parts to find out, if they could, where Egyptian architecture took its origin. But all the dreams of one's childhood and all the mysteries vanished before such discoveries as those made by Professor Petrie. One point was particularly astonishing—viz. the enormous distance of time which they were carried back. They were led to believe years ago that the Great Pyramid was built some two thousand years or so before Christ. Now they learned that it must have been built nearly two thousand years earlier than that. Again, other discoveries were spoken of as dating back to 6000 B.C.—longer than the world had existed, according to the old chronology. The whole subject was of entrancing interest, and they had all been charmed with Professor Petrie's Paper.

PROFESSOR FLINDERS PETRIE, in response, said that with regard to the question of art being indigenous, that was a very difficult matter, which he had not ventured to touch upon at present. The construction was distinctly indigenous—that is to say, each architectural element was borrowed from a material that belonged to Egypt. With regard to the art, that was another question, and he hoped he should have opportunity of showing that there were two different arts, from different sources. Then with regard to the question of those strange columns widening out towards the top, which Dr. Murray mentioned, he much regretted that no one had brought forward any illustrations from the natural materials used in Greece to explain them. He had no doubt that the origin of them might be seen in the materials used at the present day, if they are sufficiently searched for; but as no one had as yet brought forward an explanation, it would be useless for him to attempt from the side of Egyptian materials to suggest any parallel for a form so distinctly belonging to another country. The question of the natural use of growing trees in construction was particularly applicable in a wooded country such as Greece. Unfortunately, in Egypt wood was comparatively scarce. With regard to the question raised as to the nature of the wood, though it had not been examined, he could safely say that it was most likely not from Egypt at all. The wood was distinctly coniferous wood—probably cedar. In the large beams the grain was almost straight in most cases. The floor beams, judging by the irregularity of the grain, were most likely the native *sont* or acacia, which was common in the country. The large beams were particularly straight-grained, fine wood, from large trunks, out of which they could cut beams ten or twelve inches square: he imagined most likely they came from Syria. At that time there was considerable shipping intercourse, as far as Greece probably: Greek pottery had been found in the First Dynasty, and the gold found there was distinctly from Asia Minor, because it was of electrum alloy, which was not known in Africa. Therefore there was no difficulty (especially in view of the large ships, employed long before that time, figured on the tomb paintings and vases) in supposing that the timber was brought down from the wooded parts of Syria. With regard to the size of the beams, he might say that there were beams more than 17½ feet in length still remaining; and some beams of the full 20 feet required for the span of the largest chamber, which was certainly spanned in one length. He did not think they need be afraid of the load of 3½ feet of sand. It seemed rather large at first sight; but he had already mentioned that if those beams were placed side by side they would carry 30 feet of sand at breaking strain. Therefore, with some spacing of the beams, still there would be sufficient strength, as they would carry only one-third or one-fourth of the breaking load, which he thought was quite practicable. With regard to the question of the batter of the walls and the strange alternation in long walls of alternate curved courses and horizontal ones, he knew there was a suggestion of its being stronger in view of earthquakes. But he could not see that the introduction of cross joints in the wall, even if the one were battered and the other overhanging, would strengthen the wall. He did not think that suggestion would solve the question of why they made so many cross joints running right through the wall, which must have been sources of weakness. They must still look for some other reason for that strange construction of the walls in sections.

9, Conduit Street, London, W., *25th May* 1901.

CHRONICLE.

The late Arthur Cates, *Past Vice-President.*

The death of Mr. Arthur Cates occurred at his residence, 12, York Terrace, Regent's Park, on Wednesday, the 15th inst., in his seventy-third year. Mr. Cates had been in feeble health for the past five or six years. It was owing to failing strength that in 1896 he resigned his seat on the Council and on the Board of Examiners, over which latter body he presided uninterruptedly for fifteen years. There was, however, little visible sign of ill-health. He was constantly at the Institute, exhibiting as keen an interest as ever in its concerns; and that his capacity for hard work and mental effort had not declined with advancing years striking proof is afforded in the series of articles he contributed to the current volume of this Journal on "The Higher Education of Architects," the seventh of which appeared in the last issue. He had in preparation a further article for the series, dealing with architectural education in Germany. He was at the Institute two days before his death, apparently in fair health, and in the best of spirits.

The funeral took place at Woking on Saturday, the 18th, the remains being followed to the Crematorium by a large number of mourners, including, besides those of the family, numerous members of the Institute and executive, the Council being represented by Mr. John Slater, *Vice-President*, Mr. Alex. Graham, *Hon. Secretary*, and Mr. Thomas Blashill.

A special memoir will appear in a future issue.

Mr. John Slater, *Vice-President*, addressing the Meeting last Monday at the invitation of the President, said:—I have had, during the last ten or twelve years, more opportunities perhaps than any other member of seeing a side to Mr. Cates's character that was rarely apparent to his colleagues or to those who only met him in an official capacity. Mr. Cates was essentially a strong man all round, and one sometimes felt that he was a little too prone to show and use his strength. But under a somewhat forbidding external manner at first sight, there lay hidden one of the kindest hearts that ever beat in human breast. I have sometimes thought that Shakespeare's words in describing the haughty and overbearing Chancellor of Henry VIII. are applicable to Mr. Cates: "Lofty, and sour, to them that loved him not; but to those men that sought him, sweet as summer." I know personally that not a few young architects have had occasion to be grateful all their lives for the kindly advice and assistance given by Mr. Cates as ungrudgingly as unostentatiously. To see Arthur Cates in his Sunday morning's walk round the Zoological Gardens discoursing on the peculiarities of some of his pet animals to a group of keenly interested and laughing children was an absolute revelation to those who only knew him in his official capacity. I am quite sure that his death will leave a void in the lives of those who were intimate with him which will be very hard to fill. Mr. Cates was not only an able man, but he was also a very learned man. I have frequently been much struck at the evidence shown of the wide range of his reading and learning. Of his interest in and services to the Institute it is too early to speak: and it is too soon for us to attempt to appreciate his loss. The work that he did in instituting the Examinations, whatever may be the opinion of the general public as to their value, was one that we cannot possibly overestimate. If it had not been for him I am quite sure the Examinations would never have been started, and the energy with which he pressed forward his views and carried them was a striking index to his character. He was a perfectly ideal Chairman of Committees. The brusquerie and fidgetiness which characterised his manner when he was merely sitting on a Board disappeared altogether when he was in the chair. There he was urbanity itself, and the way in which he afforded every member of the Board or Committee the opportunity of expressing his opinion, and the celerity with which he got through the business, was remarkable. I hope that we shall have in our Journal, from the pen of someone who has known him longer than I have, some record of his life and work. To-night we can only regret his loss; and I am quite sure I am only expressing the feelings of those who knew him when I say that "He was a man, take him for all in all, we ne'er shall look upon his like again." In conclusion I should like to be permitted to propose that a most sincere vote of condolence be sent to Mrs. Cates from this Institute for the loss which she and we have sustained in her husband's death.

Mr. W. Woodward [*A.*]: May I, as Mr. Cates's oldest assistant, add a few words to those which have been so eloquently placed before us by Mr. John Slater? Mr. Cates was a man of considerable literary attainments; he

was a great bibliophilist and a voracious reader. His passion for work was well known to the Institute; and that passion for work pervaded his office, and did not leave him, unfortunately, when he went home. He was a very great and keen architectural critic. His memory was wonderful, and he had travelled extensively. Another feature was his marvellous faculty, in going through his morning correspondence, for grasping the contents and meaning of a letter in an incredibly brief space of time, and immediately dictating the answers. Speaking for myself and for others of his assistants and pupils, we very deeply regret his death. Arthur Cates well merited the line, if ever any man did, "Sans peur et sans reproche."

Mr. T. M. Rickman, F.S.A. [*A.*].—Mr. President, will you allow me to say one or two words to express my very strong personal feeling at the loss of our esteemed friend, Mr. Arthur Cates? He and I had worked together and fought together since 1852. He had been my nearest and most intimate professional and personal friend for all those years, and I would only mention that the last time I met him was on Saturday week, when we were both attending Professor Flinders Petrie's first lecture at the Royal Institution. I was shocked then at his appearance and his careworn look; but after ten minutes' chat I left him looking as well as ever. His last Paper in the Institute Journal contained as its most fitting postscript the application which the Architectural Association made many years ago to the Institute to establish professional examinations. I believe it was in the little committee-room at Lyon's Inn Hall that the document was drawn up, and I remember how each of its phrases came either from Arthur Cates, Alfred Bailey, or from myself. Since then we have continued to work together, not always on the same side, but I am quite satisfied that, though he was of a pugnacious disposition, there was no one so upright in the profession and no one who had the interests of the profession in its widest sense so thoroughly at heart. While he spoke of himself sometimes as a drill sergeant, there were very few of us went through an interview with him without feeling that we had learnt something at his hands; and it must have been the feeling of all those who have been educated and who came under his tuition or examination in any way, that they left him with a greater hope of future progress. I would cordially support the proposed vote of condolence with his widow, to whom I feel we are indebted for many of the last years of our friend's life.

The President.—I can heartily endorse every word that previous speakers have said. It was only of late years that I knew Mr. Cates well, and I have been astonished at his wide learning, his comprehensive grasp of all subjects in connection with the architectural profession, and the deep interest he took in its concerns. His loss is a very great one to the Institute. His work in connection with it has been useful in the highest degree. I am quite sure you will pass with one accord the resolution that a vote of condolence be sent to his widow.

M. Charles Lucas [*Hon.Corr.M.*], in a letter addressed to the Secretary R.I.B.A., writes:

"J'apprends avec une réelle émotion la mort de notre honoré et digne confrère Monsieur Arthur Cates. C'est non seulement la profession d'architecte en Angleterre qui ressent une grande perte, mais c'est l'architecture dans nombre d'autres contrées.

"Par les soins que M. Arthur Cates avait donnés à l'achèvement du *Dictionary of Architecture*, par ses études sur l'enseignement de l'architecture dans les divers pays et l'heureuse application qu'il s'efforçait d'en réaliser en Angleterre dans les examens de l'Institut Royal, plus encore peut-être par la haute situation qu'il avait montrée pouvoir être confiée à un architecte, celle de Président d'un Tribunal d'Appel de contraventions relatives à l'architecture urbaine, M. Cates, votre ancien Vice-Président, mérite qu'aucun des membres de l'Institut Royal ne laisse passer sa mort sans exprimer une parole de regret.

"Pour moi, qui avais eu l'honneur de le présenter en 1899, comme correspondant de la Société Centrale des Architectes Français, à la suite de l'envoi du *Dictionary of Architecture*, j'avais l'honneur et le plaisir de voir, depuis quelque temps, notre échange de correspondance devenir plus fréquent au sujet de l'enseignement de l'architecture en France, enseignement sur lequel il voulait être renseigné jusque dans ses moindres détails, ainsi qu'en témoigne la série d'articles qu'il a publiée dans le Journal de l'Institut."

Monsieur J. M. Poupinel, Secretary of the Société Centrale des Architectes Français, writes:

"Nous avons appris avec le plus vif regret le décès de M. Arthur Cates, ancien Vice-Président de l'Institut Royal des Architectes Britanniques et Membre Correspondant de la Société Centrale des Architectes Français. Nous en sommes très attristés et estimons que notre Société, comme la vôtre, vient de faire une grande perte; ne doutez donc point, je vous prie, de la sincérité de nos condoléances."

The Tribunal of Appeal.

The Council have appointed Mr. Edw. A. Gruning, *Vice-President*, to fill the seat on the Tribunal of Appeal left vacant by the death of Mr. Arthur Cates.

The late Ebenezer Gregg [*F.*].

Mr. Ebenezer Gregg, who had been a Fellow of the Institute for over thirty years, and for many years served on the Board of Examiners (Architecture), died on the 14th inst. The Hon. Secretary, in announcing his death at the Meeting last Monday, said that his genial presence was always welcomed in that room. He was a very active member of the Institute, and took a great interest in its affairs. His services for a number of years as a member of the Board of Examiners reflected great credit on him, not only for his ability, but for his assiduity and his loyalty to the Institute. The Board of Examiners would miss the kindly face of their colleague very much. He was always anxious to fulfil the duties entrusted to him in his section of the work, and he performed them thoroughly and conscientiously. The Council, on behalf of the Institute, had sent a message of sympathy to his widow and family, and had forwarded a wreath on the occasion of his funeral as a mark of respect to his memory.

The A. A. Day Courses of Instruction.

The Architectural Association announce that arrangements have been made to open in October next a complete day course for students contemplating entering the profession of architecture, in addition to the present evening course, which will be continued as heretofore.

The following is quoted from the circular issued by the Association giving particulars of these classes :—

Architects feel that pupilage should be preceded by some elementary training preparatory to an office career. Pupils are frequently unable to take advantage of the opportunities offered in an architect's office because they have not previously studied the elements of their work ; consequently they are only beginning to learn something about architecture when their articles terminate.

A year or two spent in such a school as is now established will enable a student to acquire, at moderate cost, the rudiments of his work, before learning in an architect's office the practical details of his profession.

The School will have the further advantage of testing the student's aptitude for the profession. If he should find the work uncongenial he can abandon the pursuit of architecture.

Many architects do not care to receive pupils who are beginners, but they would probably take young men if well grounded. In many cases the period of pupilage might be shortened.

Students already articled and unable to attend the studio regularly can make special arrangements for partial attendance if desired. In this case they are also advised to attend the evening lectures.

The students will be under the direct control of a thoroughly qualified architect as master, assisted by such staff as may be necessary.

The school year will be divided into three terms, Autumn, Spring, and Summer, consisting of about fourteen weeks each.

Students wishing to join the school must submit a satisfactory letter of recommendation.

The fee for the full course is twelve guineas per term, or thirty-five guineas per annum ; or, for the lectures only, two guineas per term, or five guineas per annum for either the History or Construction course. All fees are due in advance, and cheques should be made payable to "The Architectural Association."

After payment of the fees for the first year's course, students will be eligible for election as ordinary members of the Architectural Association without payment of the usual entrance fee of two guineas.

The following subjects are included in the Curriculum :—

First Year's Course.

The Studio.—The use of instruments and scales.—Freehand drawing.—Elementary perspective.—Orders of Classic Architecture.—Elements of the various styles of Architecture.—Principles of Mechanics.—Elementary Construction.—Sketching and measuring details and portions of existing buildings.

Lectures.—History of Architecture, thirty-six lectures (*illustrated by visits to Buildings and Museums*). Elementary Construction and Materials, thirty-six lectures (*illustrated by visits to Workshops and Buildings in progress*).

Second Year's Course.

Continuation of the subjects forming the first year's course.—Advanced Perspective and Sciography.—Descriptive and Applied Geometry and Graphic Statics. Principles of Architectural Design.

Students taking a second year in the studio should attend such day or evening lectures as the Master may advise, certain evening lectures being open to second year students without further payment.

Each student will be expected to take up a course of reading under the direction of the Master, and for this purpose the Studio Library will be available.

The Master will direct students as to their vacation studies.

The Advisory Council of the School consists of the following members :—Professor G. Aitchison, R.A. [*F.*], Dr. R. Rowand Anderson, H.R.S.A., F. T. Baggallay [*F.*], John Belcher, A.R.A. [*F.*], Hippolyte J. Blanc, R.S.A. [*F.*], J. M. Brydon [*F.*], J. J. Burnet, A.R.S.A. [*F.*], W. D. Caröe, M.A., F.S.A. [*F.*], T. E. Collcutt [*F.*], Henry L. Florence [*F.*], Ernest George [*F.*], Henry T. Hare [*F.*], T. G. Jackson, R.A., E. W. Mountford [*F.*], Leonard Stokes [*F.*], C. F. A. Voysey, Alfred Waterhouse, R.A. [*F.*], Aston Webb, A.R.A. [*F.*]

Further particulars may be obtained upon application to The Secretary of the Architectural Association, 56, Great Marlborough Street, W.

Lightning Research Committee.

The following is the Schedule of Questions drawn up by the Lightning Research Committee for the guidance of observers in sending particulars of damage to buildings caused by lightning stroke :—

1. Name of building struck, and for what purpose used. (A photograph taken after the disaster would be useful.)
2. Date and hour of occurrence ; name of place and county.
3. Description and situation of the building, and height above sea-level. (Give particulars as to its position with regard to other buildings and high trees, and its propinquity to any wells.)
4. Was rain falling when building was struck ? If not, did rain precede or follow the stroke, and at what interval ?
5. Was the building provided with lightning-rods ? If so, state number, position, height above roof, material (both of rod and staples), shape, sectional area, how finished at top and at bottom, condition of ends after flash—*i.e.* whether melted or blunted. (A sketch plan should be made, which should aim at being a sort of Röntgen-ray representation, the metal-work being shown a different shade from the brick and stone work.)
6. Was the conductor continuous ? Describe the earth-connection. When was the conductor last examined and tested ?
7. Nature of soil.
8. State fully the effect on the building ; if any portion was set on fire ; also if any damage occurred to metal-work, such as bells, rain-water and other pipes, electric bells or telephones, &c.
9. State distance (vertical and horizontal) of any portion of the building affected by the lightning from the nearest point of the conductor. (If stones, &c. were displaced, state to what distance.)
10. State materials of roof coverings, and position of gutters and down-pipes. Was the conductor in contact with any other metal ?
11. Were there any metal cresting, weather-cocks, finials, or flagstaffs ? If so, state distance from and height above conductor.
12. If the conductor was struck, state whether the damaged portions can be obtained for examination.

Members willing to act as observers are requested to communicate with "The Secretary, Lightning Research Committee," at the offices of the Institute.

The Church Crafts League.

The subject discussed at the half-yearly general meeting of the Church Crafts League was "The Importance of Reality in Art and Religion," the Bishop of Rochester presiding. Canon Scott Holland said that it was important to remember that individuality in art was not a mere eccentric detachment from the spirit of the time, but was the embodiment of the feeling of the great corporate body. In the matter of church music, much had been said by expert musicians as to the folly of having a precentor to direct the music in churches where the organist was a competent artist. But it was not as if the Art was standing alone. It was called in to assist the worshippers, and therefore the precentor was, for the time being, the expert. The same principle applied to all other branches of Art, and it was just this that distinguished religious Art from secular.—Mr. Henry Holiday dealt at length with the conditions under which the modern journeyman had to live and work. It was impossible for a man to take any intelligent interest in, or to put his heart into his work now, because the conditions of modern commercial life had converted him into a mere machine.—The Rev. Percy Dearmer, the next speaker, said that when one looked at the homes of the people one saw an utter absence of beauty—everything was shoddy and cheap. When one looked at the churches, one found much the same thing. Most of the fittings were made to look as if they had cost twice their real price. There was an entire absence of that reserve which goes so far towards making a thing beautiful. In music, the Church had formed a tradition, and many of our greatest musicians had been brought up at our cathedrals, where that Art had been carefully nurtured, even in the darkest times. The result of this on the nation was striking. For every ten persons who cared for music, you only found one who had an appreciation for the other forms of Art. Again, if the decorations of a church were so vulgar and bad that one's nerves were affected, that it was impossible to worship, one was considered affected if one said so. But if the music at a church was noisy and vulgar and in bad taste, one was considered to have a very plausible reason for staying away.—Mr. Halsey Ricardo said that Art was a man's message to his fellow-men. Every artist had to learn all that his predecessors had learned, and then go on beyond them. Thus Mozart, in one age, learned all that could then be learned about music, and built up his own work on that. Beethoven, in another age, had gone beyond all his predecessors, and, still later, Wagner had done the same.

The Queen Victoria Indian Memorial.

The Institute has received from the Executive Committee of the above Fund the first part of a

journal which is to be issued at intervals during the period of three or four years in which the proposed Memorial scheme is taking shape and the building is being erected. Copies of the journal are to be sent regularly to the Institute, and will be laid on the Library table.

Among the papers printed in the present issue is a memorandum written by the Viceroy, Lord Curzon, as the result of a conference held between himself and a number of representative European and native gentlemen in Calcutta, immediately after the death of Her late Majesty.

From this it appears that it is in contemplation to erect at Calcutta, as the capital of the Indian Empire, a great marble building, the central feature of which shall be a Hall devoted to the memory of Queen Victoria, and containing such relics as it may be possible to procure of Her late Majesty, particularly in relation to her rule over India, which first passed under the direct administration of the Crown during her reign. The remainder of the building is to consist of galleries and apartments dedicated to collections of statuary, paintings, arms, trophies, and memorials in general of bygone Indian history, and more especially of the period of British connection with the country.

The objects it is desired to collect for the Hall are: (1) Statuary and sculpture; (2) Paintings, miniatures, engravings, and prints; (3) Documents, manuscripts, and letters; (4) Maps, plans, and models; (5) Arms and accoutrements; (6) Coins and medals; (7) Personal relics or mementoes, and historical trophies.

As regards the site and building, Lord Curzon says:—

> The best available site is the open space between Esplanade Row on the north, the Ochterlony Monument on the south, Government House Gardens on the west, and Chowringhee on the east. It is at present traversed only by foot tracks, and wandered over by occasional cattle and boys. The proposal is to take this tract of ground, occupying about 900 feet from north to south and 1,100 feet from east to west, and to convert it into a beautiful garden, with flowerbeds and shrubs and trees. In the centre of this garden would be placed the Victoria Hall, to contain the collections that have been described—no other building whatsoever being admitted to the enclosure. Security would be taken, by enlisting the names of the best architects that the Empire can produce, that a worthy building were raised, fronted by a noble approach.

LEGAL.

Alleged Negligence.

PAGET *v.* DOLLAR.

This was a claim to recover damages for negligence, which was denied. The case was heard by Mr. Justice Wright in the King's Bench Division.

Mr. Joseph Walton, K.C., and Mr. Ashton Cross appeared for the plaintiff; and Mr. McCall, K.C., and Mr. A. Hudson for the defendant.

Mr. Walton stated that in March 1897 the plaintiff Major Paget, who is now in South Africa, employed the defendant, an architect, to prepare plans for certain flats at Church Row, Hampstead. The plans were prepared, and a tender was accepted in March 1898 for erecting the flats. The defendant then requested an increase in his fees, which was refused. It was then agreed that the defendant should hand over the plans for the sum of £501, then paid to him, and withdraw from the work. It was assumed and understood by the plaintiff that the necessary consent of the County Council had been obtained. It transpired that this was not so. The building line was found to be in advance of the general building line of the street, and, to a large extent, new plans had to be prepared before the consent of the Council could be obtained. This caused additional expense and a delay of several months. The defendant should first have obtained the consent of the Council, and not merely the district architect's approval.

For the defence a large number of eminent architects were called. They stated that the defendant had followed the usual custom, and had done all that prudence would suggest; it was not always wise to anticipate the Council's objections.

Mr. Justice Wright, on the 12th May, gave judgment for the defendant with costs.—*Times*.

MINUTES. XIII.

At the Thirteenth General Meeting of the Session 1900–1901, held Monday, 20th May 1901, at 8 p.m., the President, Mr. William Emerson, in the Chair, with 36 Fellows (including 13 members of the Council), 38 Associates (including 2 members of the Council), 1 Hon. Fellow, 2 Hon. Associates, and numerous visitors, the Minutes of the Meeting held 6th May [p. 334] were taken as read and signed as correct.

The President announced the decease of Mr. Arthur Cates [*F.*], *Vice-President* 1888–1892; and Messrs. John Slater, *Vice-President*, Wm. Woodward [*A.*], and T. M. Rickman [*A.*], having paid their personal tribute of affection and regard for the deceased, and referred to his long and unwearied labours in the cause of architectural education, the Meeting

> RESOLVED, that the Institute do record its sorrow at the loss it has sustained by the death of its esteemed Fellow, Arthur Cates, and that a message expressing the Institute's sympathy and condolence be conveyed to his widow.

A similar vote of condolence was passed to the widow and family of Mr. Ebenezer Gregg, *Fellow*, Member of the Board of Examiners, whose death was announced by the Hon. Secretary.

Sir Lawrence Alma-Tadema, R.A., attending for the first time since his election as *Hon. Fellow*, was formally admitted.

Mr. William Ernest Emerson, *Associate*, was also admitted, and signed the Register.

The Secretary announced that Mr. Charles James Sculthorpe Hall, Professor of Architectural Composition in the Puebla State University, had been nominated by the Council to candidature for the class of Fellows.

Professor Flinders Petrie, D.C.L., having read a Paper on THE SOURCES AND GROWTH OF ARCHITECTURE IN EGYPT, which was illustrated during the reading by a numerous series of lantern slides, a discussion ensued, and a vote of thanks was passed to the author by acclamation.

The proceedings then closed, and the Meeting separated at 10 p.m.

GLAZE.

"Mors est in olla ista, vir Dei!"

PLUMBISM, or lead-poisoning, is a subject in which an architect may very properly and very profitably be interested. The constant use which an architect makes, on his client's behalf, of materials to which pottery glaze is applied gives him many opportunities of at least investigating the conditions under which these materials are produced, and of giving, where he can legitimately do so, the preference to those products which are manufactured under the more favourable methods. My own claim to say anything upon this subject is simply that of one who, having been entirely ignorant on the matter, or indifferent, feels that possibly other architects may have shared this ignorance and this indifference.

Those who have noticed occasional writings in the daily press and elsewhere on the subject of lead-poisoning have very probably attributed a portion of the reported horrors to the exaggerated zeal of biassed philanthropists, who sometimes approach such topics with an ardour which is rather political than discriminative. Or perhaps it has been concluded that, even if the pottery trade be a dangerous one, the question of its peril to the workers concerns the dull conscience of the manufacturers, the carelessness of the employés, or the negligence of inspectors. Maybe there have been exaggerated statements on the subject—there are on most subjects about which people wax enthusiastic—but we are at least safe from exaggeration in the sufficiently striking evidence of the Bluebooks and official statements. Maybe the manufacturers are doing less than their sense of duty should compel them to; but among them are some notable exceptions, who deserve such encouragement as they can get. Maybe, finally, there is indifference among the very victims: but such indifference, where it exists, is surely an aggravation, not a mitigation, of the evil. Two facts remain incontrovertible—the one that we have, on the testimony of unimpassioned Bluebooks and medical reports, a positive proof of the physical evils of lead-poisoning as brought about in the pottery trade; the other that these evils are largely, if not entirely, avoidable. And to these two facts one should add a third (which is at least as near a fact as a proposition in political economy ever can be), that the responsibility for the existence of avoidable evils in any trade rests proportionately, if not ultimately, upon the consumer.

The state of the case is briefly this. The glaze on pottery, tile work, or faïence, has hitherto, and specially of late years, been very generally produced by the use of lead. Such use of lead, if it be raw lead, leads almost inevitably to illness among the workers. It is not pretended that a glaze-hand, in a pottery where raw lead glazes are used, necessarily falls a victim, nor that a slight taint of plumbism necessarily leads on to the worst results. But any reader of ordinary humanity who will study such a pamphlet as *The Potter and Lead-Poisoning*, by Dr. Dowling Prendergast, will realise that the evils contingently attendant on this industry, especially those which strike so horribly at the well-being of womanhood, maternity, and posterity, are evils to be avoided and frustrated, even, if need be, at some sacrifice.

Now, it would not be honest to say that as good results can be attained for *all* purposes, at the present time, by the use of absolutely leadless glazes as by the customary methods. In the production of certain delicate colours in faïence and tiles, leadless glazes have *hitherto* not been so successfully employed as glazes with a lead flux. This one must admit, but the admission is tempered by so many qualifications that the cause of anti-plumbism is by no means to be considered quenched on this account. In the first place, it should be observed that in the manufacture of faïence and tiles the choice does not lie exclusively between the use of raw lead and the use of none: there is a certain *via media* which, if we assume (as we have no right to assume) that leadless glazes cannot be rendered applicable to delicately coloured tile work, is capable of providing admirable results and a harmless process. I refer to the use, not of raw lead, but of "fritted" lead. The term "frit" is applied by the potter to a mixture of all the materials required for a glaze which is fired at a higher temperature, and to which, as I understand, the lead, where required, is added during the process of grinding. The lead so treated, especially in a boracic frit, is found to be capable of resisting "decomposition when brought into contact with a weak hydrochloric or other acid in the human system": in other words, it is rendered uninjurious. I believe it may be said that those manufacturers of faïence who at some sacrifice of immediate profit have set themselves to abandon the use of raw lead in favour of that which has been fritted have already begun to realise, not merely that they have improved their workshop conditions, but that their products have by no means suffered in appearance and quality.*

But more than this has been done. One or two enterprising pottery firms who have taken an interest in this matter have been and are still experimenting in the use of absolutely leadless glazes. They have had a good many failures, total and partial, but the improvement which has attended some of their efforts gives reasonable cause to hope that the absence of complete success is attributable at least as much to the newness of

* One should not be absolutely satisfied by the assurance that fritted lead is employed. Even in frits, the lead sometimes retains an undue degree of solubility (ascertainable on analysis), and many users of frit supplement it by a subsequent use of *raw* lead to assist the flow of the glaze.

the venture as to the difficulties of the enterprise. I have by me, as I write, certain examples of glazed tiles, and particularly of lustre tiles, which have gained as much as they have lost by the conditions and limitations of the leadless process.

Furthermore, there are many articles made with glazed ware in which the value of the glazed surface is rather utilitarian than æsthetic, and in such articles it is a matter of comparative indifference whether a perfect colour tone is attained or not. As an instance, though not an architectural one, may be mentioned the insulators of telegraph posts, which are now, under a Post Office regulation, made exclusively with leadless glaze. It fortunately happens that, either by choice or under Home Office pressure, all the principal makers of glazed bricks, such as are used for the walls of areas and other places where light and cleanliness are essential, nowadays turn out their simpler colours, such as white and ivory, in leadless glaze, though the more delicate colours are generally produced with lead. The familiar brown salt-glaze is, if it be a true salt-glaze, free from all lead, and under this category come most makes of stoneware drain-pipes, &c.

Among the makers of sanitary goods there has been till quite lately a certain backwardness in the cause; but at last the difficulties, which no doubt were more apparent than real, are being surmounted with such surprising success that at the present time, and under the present conditions of Government regulation, it is as likely as not that a bath or a lavatory basin ordered from one of the better-known firms will be supplied in leadless glaze. Some firms offer to produce leadless articles at 10 per cent. advance on the injurious method; others will, at the customer's option, supply leadless goods at the same price; others, again, pride themselves on making nothing but the leadless material; and certainly there is in most of such articles that I have inspected nothing to be said on the score of appearance against the use of that form of glaze which relieves the worker of the dangers inherent in the old method.

There remains the question, How are we to know that we get leadless glaze when we have ordered it? The answer is simple. In some ware the difference can be seen—by an expert eye; in others it is a matter of analysis. Even without in any way damaging the material, the truth can be ascertained in two seconds by the use of the refractometer. Now of course architects do not keep either laboratories or refractometers, and therefore the ultimate appeal is to some friendly man of science or to the Government laboratory, where I believe I may say that the director is quite ready to deal up to reasonable limits with the increase of work that might result from applications on the part of architects. Not that we need send a sample out of every order for test. A very occasional use of this final criterion will be enough for ordinary purposes.

The sum of my suggestion in the matter is simply this—that in ordering those sanitary and other goods which are made equally well in leadless and in free-lead glaze we should assist those manufacturers who are making efforts in the right direction, by ordering the harmless variety; and that in making use of coloured tiles we should, where a client's pocket will not suffer, give some encouragement to those who are attempting the production of leadless faïence if it should prove that we can secure in this material the work of art which it is our business to produce. If we cannot do so without violence to our conscience as artists—for someone will be reminding me that architects do not exist primarily as engines of philanthropy—we can at least do something by inquiring into the nature of the glazes that are employed in the material we are about to use.

Thanks to the energy of others, we have no inert mass of opposition to overcome. The ball is set rolling, public opinion—or the opinion of a section of the public—has begun to work, manufacturers have begun to meet its call, many of them, to their honour, with energy and alacrity; many official bodies have commissioned their architectural and building departments to help the cause by specifying the use of the harmless material. The ball, I say, is already rolling: it is possible for us architects to give it a thrust now and then in the right direction, and to have our little share in hastening the ultimate suppression of this evil.

PAUL WATERHOUSE.

"THE CLASSIFICATION OF ROMANESQUE" AND THE BIRTH OF GOTHIC.

MR. BOND'S valuable Paper should not be allowed to pass without some discussion. At the meeting on 22nd ult. it only elicited a supplementary contribution of interest, but was not really discussed. In case Mr. Bond is able to continue, by entering the domain of Gothic in a future Paper, it may be as well not to leave all collateral remarks until after its delivery.

It will not be altogether supererogatory to recall some salient points in the Paper; for even with maps, plans, photographs, and books at hand, it wants the grasp of a "Memory-Corner Thompson" to keep cited examples duly in mind for comparison. Nor are all the works quoted available in the Institute Library.

As Mr. Bond advances several pertinent side inquiries having relation to points in chronology, &c., I may be excused if some of my remarks are but *en rapport* with the subject matter, it being

difficult to fix a boundary where Romanesque shall end and Gothic begin.

Touching the earlier classifications, to which some consideration is given—not a universal practice, by the way—we have De Caumont's geographical-*cum*-ornamental basis of arrangement, and certainly we must agree that it is entirely misleading if wide ramifications and "outliers" be not conceded. If we may judge alone from masons' marks, guilds and fraternities, and even individuals, moved over wide areas, unfettered by boundaries, and took their individuality with them to work in hand.

Generally, the tide of inter-provincial commerce by river and road, and following valleys and plains, induced extension of some remarkable type, but there may be no obvious reason for many "outliers." The founding of a distant branch of some religious Order, away from the mother establishment, accounts for some of them. We hear of a church in Buckinghamshire designed by the architect who planned Lund Cathedral in Sweden, an apparently unlikely track, not following the east-to-west movement.* From south and west Europe to Syria also, during the later Crusades, was a reaction therefrom, like the French work in Cyprus of the Champagne and Burgundian schools, and that by a Sicilian architect in parts of the Church of the Holy Sepulchre. Ornament, perplexing enough, can hardly, however, be ignored. Such archaic sculpture in what seems later work, and such widely spread similarity occurs, that a complete analysis of the capitals of Christendom—*e.g.* if possible—would reveal extraordinary correspondences, but could not alone allocate a building to any particular school of architecture.

Quicherat underrates the importance of aisle-vaulting, which offered no constructional difficulty, the *crux* being the covering of a wide nave.

Mr. Bond includes this with the consideration of other features—the crossing, clerestory lighting, tower design, and plan; and when all are taken into account the difficulty is increased of arriving at a reasonable synthesis, for it may be that to attempt more than a general grouping would be almost pedantic.

I think Viollet-le-Duc, whose classification Mr. Bond says is not very helpful, would have agreed that all those features should be considered. His seven schools (defined in the seventies), no doubt, may be subdivided if this is done; and yet, in cases of "outliers" mixed with local art traditions, some if not many cases may be found which it will always be impossible to set down absolutely to one school of architecture. It is evident that V.-le-Duc was impressed with the value of the tower in synthesis. The article "Clocher" in the *Dictionnaire Raisonné*, not mentioned in the Paper, occupies 122 pages, and supplies ninety-four illustrations. I give them as supplemental to the seven schools under the article "Église," quoted in the Paper (which only occupies thirty-three pages of that work); viz. Aquitaine (two distinct groups), emanating from Périgueux; Burgundo-Dauphignian (Autun); Auvergne (Clermont); Isle of France (Paris); Normandy (Caen); Austrasie (Aix).

M. de Verneilh reproached him with this—"C'est de pousser l'esprit d'observation au point de trop bien voir, ou du moins de voir trop de choses." M. Saint-Paul also thinks many of Le-Duc's views on foreign influence on French work far-fetched. Mr. Bond points out (p. 271) that much of it shows characteristics of more than one school, and so it is in English buildings all through the Transition period until our lancet-arch style arose; and, again (p. 289), is a reservation showing that he is in accord with M. Saint-Paul: "Il est périlleux en archéologie de prétendre classer d'une manière tout à fait absolue les divers styles d'une même époque."† Besides which there is the initial difficulty of determining whether they *are* of the same epoch.

With regard to exotics, the barrel-vaulting of Fountains Abbey is an introduction from Normandy, as the compound pier—*e.g.* in the tower at Boxgrove Priory—was a later exotic of the French school proper; or (if following Saint Remi de-Reims) a joint influence of three schools there converging—Aix, Paris, and Autun. The pointing of colonnettes and bowtels probably was the latest influence of that school on our architecture of the period.

M. le-Duc's map shows the Norman (Caen) school as crossing the Channel, and may be taken in its ramifications as giving us existing parts of Christchurch, Romsey, and Winchester in Hants; Chichester in Sussex; Rochester and Canterbury in Kent; The White Tower, St. John's, Clerkenwell, in Middlesex; St. Albans, Herts, and other abbeys and cathedrals further away. From the French school, later in date but by the same channel, I believe, came the features of Shore-

* This has been explained in a general way by Seesselberg in his work, *Die Fruch-Mittelalterliche Kunst der germanischen Voelker*, p. 95:—"Dass englische Missionäre bereits um das Jahr 1000 in Westergoetland und Smaland einen festen Sitz gewonnen, und eine gewisse Organisation geschaffen hatten. Etwa 1014 wurde Bernhard in England durch den daenischen Koenig Knut in Lund als Bischof eingesetzt; etwa gleichzeitig wirkte in Roskilde der Bischof und koenigliche Kanzler Wilhelm von England. Es kann daher kaum einem zweifel unterliegen dass die ersten Kirchen in Lund und Roskilde nach englischer Bauweise in rohem stein-material aufgefuehrt, und der Olafskirche in Sigtuna sehr aehnlich gewesen sein muessen. Von den ersten englischen Baudenkmaelern in Westergoetland (Husaby), und Smaland (Wexio?), sind keine als solche erkennbaren Ueberreste auf uns gekommen." Mr. Tavenor Perry mentioned the case, but the architect's name did not transpire.

† Saint-Paul, *Viollet-le-Duc*, p. 197.

ham, Steyning, Boxgrove—remarkably elegant work, though much curtailed in extent respectively; and William of Sens brought French influence to additions at Canterbury, as an isolated case. I wish we could claim more as of English inception, but perhaps it may be conceded that the handsome, boldly-moulded Norman archivolts we possess over very plain columns, as early as *c.* 1090, are peculiar to us; as clustered columns with very plain arches over are peculiar to France. If not, it must, I think, be conceded, we borrowed everything thence, until as by a flash of originality the lancet-arch style was born, almost negativing M. Brutail's dictum—

"Jamais à aucune époque et dans aucun pays un type architecturel ne s'est formé d'un seul coup."

Who were they who first introduced in Western Europe the circular and pentagonal school of church building, prior to and independent of the two orders of Knights? The point is suggested p. 272. Were they derived from S. Sepulcro, Bologna, or the pagan edifices of Rome? It is clear the Jews had nothing to do with it. It is pretty certain that neither St. Sepulchre's, Northampton, nor St. Sepulchre's, Cambridge, was built by Hospitallers or Templars. Simon de Liz is said to have founded the former, but whence came his architect or master mason we do not know. There were earlier examples than those of the twelfth century, some, but not all, being mortuary chapels. Later on baptism became the *motif*, both being subsequent to the utilisation of pagan rotundas for Christian worship. In the twelfth century we find them as far north as Sweden. The name of Saint-Germain-le-Rond* was given to a church in Paris as early as the ninth century, and its actual date (since it is attributed to Childebert) would be nearer the sixth century. What school did it belong to, if not of Lombardy?

Looking through the list of round churches, we find our best known example in the Strand among the latest in date,† and foreign influence there is not so marked, as, judging by remains lately unearthed and classified, it was at St. John's Priory, Clerkenwell, where compound piers (*c.* 1170) have the pointed colonnettes, which I believe originated in the district of Oise early in the twelfth century, ninety or a hundred years before use at Finchale Priory, Durham, or Roche Abbey, Yorkshire (*c.* 1230), the latter being a very deeply cut section.

From Romanesque work to the inception of Gothic may be but one step, but much more is implied in the general use of the term. If the solution of the problem of vaulting a wide nave with aisles as abutment was the birth of Gothic, and if, as Mr. Bond says, "it was solved before the first Gothic architect ever handled a trowel"—I suppose at Morienval, Oise,‡ and Durham, *c.* 1133—then all wide-nave examples of later date in England are Gothic (whether round or pointed arches prevail in construction of the supports and features), and come into that nomenclature, and the term "Transitional" is incorrect; so that Sharpe's chronological table would be revised as Norman, 1066–1130; *Gothic* 1130–1190; Early English, 1190–1245. But this would be somewhat like the application of the word "Englishman" to a *nouveau-né*. As a possible or actual parent, Durham remains Romanesque.

Regarding the relative rate of progress between England and France, M. Lefevre-Pontalis assumes that the ribbed vault was employed much earlier in the west of France than in England. Was it really *much* earlier? Lessay and Durham seem to have run neck and neck. Mr. Bond says, p. 287: "The Norman school was most backward of all in the eleventh century," and on p. 282: "The unvaulted nave was nearly universal in Normandy and England till the twelfth century was well advanced"; but were not Speyer and Vézelay in the East vaulted quite at its commencement, and were not many choirs in the West ribvaulted during the first quarter of the twelfth century, by which the problem was solved? It seems as if the credit of the first application of the pointed arch in ribbed vaulting must ever remain unawarded. What was the date of the vaulting of S. Michel, Pavia, a building apparently much older than early twelfth century, to which epoch it is now reduced from 1004 A.D.? Was the "archaic" rib vault at S. Ambrogio, Milan, p. 281, a remnant of the rebuilding of the nave in the second half of the eleventh century? If so, it would be the earliest known example. If it was part of the 1196 restoration, it would hardly be "archaic," though clumsy.

If we follow Mr. C. H. Moore, who allows us no Gothic at all in England, we must start with "Pointed" at *c.* 1130, antedating "Early English" sixty years; and so New Shoreham, *e.g.*, would fall under the latter classification instead of Transitional. Probably Mr. Moore's deductions are not generally accepted in England;—but of French claims a word or two presently.

At p. 272, Mr. Bond transfers the credit for statical design to the Romanesque builders, seeking to right what he believes has been wrongly attributed to the credit of later comers, on the ground that all the main difficulties had been

* After the twelfth century its name was altered to "Saint-Germain-l'Auxerrois."

† Little Maplestead, Essex, comes last.

‡ I believe Mr. Spiers puts the date 1140 for St. Denis (described as Gothic, p. 280) as the earliest use of the pointed rib; but was not Morienval, 1122, pointed rib also, according to Mr. Bilson eighteen years earlier, and "the rib the common property of all districts which were occupied with the problem of vaulted construction?" (R.I.B.A. Journal, Vol. VI., p. 262). The date of Morienval is, perhaps, doubtful.

solved, but on p. 277 he qualifies that which is to be allotted to the builders of the tenth and eleventh centuries; but, nevertheless, believes that in the early years of the twelfth century, engineering skill had practically done its work, and it only remained for succeeding architects to lighten and embellish.* If the comparatively flat flying demi-arch at Gloucester, Durham, and La Trinité, Caen, and elsewhere, even barely answered its purpose of checking the outward thrust of the nave vault, it must, I think, be admitted that the later raising of a stay above the aisle roof was, as Mr. Bond says (p. 280), a "development" only; but it was surely too low to do the work *per se* without the aid of a cross-wall upon it. I incline to have greater belief in their scientific knowledge than their historical and chronological accuracy, wherein hearsay, tradition, and superstition had much injurious influence.

Cathedral choirs being so often the first part to be erected, it seems strange they were vaulted before the nave, for they had an equal width in many cases. Was it not a mere question of cost, or scarcity of masons when so much work was being done? In the smaller churches where apsidal chapels are narrow, as at St. Mary's, Guildford, Compton, Surrey, and others, the early vaulting with ribs is easily accounted for. What may be described as the archaic example at St. Nicholas, Exeter, brought to our notice by Prof. Baldwin Brown, is of great interest, and would be still more so if the date (*c.* 1087–1100) could be well authenticated; but it is so easy to be misled by documentary evidence, especially when not contemporary, which is mostly the case. On p. 285 Mr. Bond says: "The pointed arch was in use early," in the Perigordian school. It would be interesting to get approximate date. I do not find this view suggested in Mr. Spiers' Paper, but note that Mr. Penrose suggested that the eleventh-century domes were the first instances of its use in the district.

Fergusson, whose acumen is referred to by Mr. Spiers, did not consider the pointed arch as of great consequence in the inception of Gothic, though he could not have denied its engrafting was its life and soul. In a Paper read before the Institute more than half a century ago, he said we must guard against

> Confounding the invention of the Gothic style with that † of the pointed arch; . . . the first is a purely indigeno

and native elaboration from Roman art, without any trace of copying or even imitation. The latter is a mere *subordinate characteristic* of that style, and not at all entitled to the rank it has hitherto assumed in the controversy.

Admitting its Eastern origin, he adds:

> The hint was given in the East, but nothing more; it was applied to Gothic buildings in a manner it had never been used in the East, and was so incorporated with and worked into the native style that it lost all trace of its origin and became as native as any other part of the true Gothic. Northern architects so applied it in our mediæval cathedrals as to be entitled to all the credit for our beautiful buildings.

Do we now traverse this view of "subordination" in affirming that the pointed vault gave birth to Gothic? The Eastern origin of that form of arch is not now, I believe, so generally admitted, and one of the pet and seemingly pertinent theories—viz. the influence of the Crusades, in regard at all events to its transportation into Western Europe—is strongly denied by some writers; but I am not aware that anything more likely has been advanced by the objectors. There may be one thing perhaps noticeable, and that is, if it did not come as an inspiration, and if the sight of the Holy Sepulchre alone gave the hint to the Crusaders and their followers, the observation must have been close—perhaps really professional, for some doubtless were architects—because the pointing of the arches there is slight, and not much above the semicircle (*vide* Mr. Dickie's drawing, R.I.B.A. JOURNAL, vol. vi., p. 243).‡ The same applies to De Vogüé's view of Kul'at Simân (vol. vii., p. 381), if they ever went so far inland. In fact, except in the octagonal court, it is the bowing of a Classic entablature and cornice into a semicircle that occurs.

M. le-Duc's opinion was: "Que les Croisades aient été la cause de ce phénomène, comme quelques-uns l'ont prétendu, j'ai peine à le croire; les faits sont en contradiction évidente avec cette opinion." M. Saint-Paul asks why they did not import Syrian architects, if they were so enamoured of the pointed arch, to build for them in France. In the first place, the climate was not adapted to wholesale importation of Eastern types; then they had a noble style of their own, and the borrowing of one feature that would meet a long-felt want (in vaulting) seems natural enough. When the Prince Regent wanted an Oriental Pavilion at Brighton he did not import an architect

* The weighting of the raised clerestory wall at Paray-le-Monial, or La Charité, to sustain the waggon-vault, is advanced as being quite as scientific as the weighting of a Gothic buttress by a pinnacle (p. 279). But surely it involves a great waste of material, and is not so scientific as the light but adequate *multum-in-parvo* buttress with pinnacle, though it may have effected the purpose required. Wren adopted the wall-weighting system at St. Paul's, and contrasted what he thought was its excellence with the "barbarous Gothic buttress," as he contemptuously called it.

† "Importation" obviously intended.

‡ They may date back nearly to 1010, after the destruction of the church by the Khalif. The more acutely pointed range there shown is no doubt the Crusaders' own work in restoration after 1099. Probably St. Helena's Crypt had round arches prior to 1010. The capitals are more ancient than the pointed arches that spring from them, and so are the wall-piers, in Mr. Dickie's opinion. There is an acutely pointed arch in the little church of St. John close by, a later addition, as to which both date and builder are unknown.

from India. Although Syria was some time in Christian occupation, the Saracens were not conquered in such wise as ever to desire to help or amalgamate in regard to art, commerce, or customs. All that the Crusades did, according to Michaud, was in regard to the plastic arts, viz. to impart "une espèce d'essor," imprinted on the mind by Eastern travel.

It is to be noted that the Hospitallers were not a military Order till 1113, but the Crusade in 1096, and the capture of Jerusalem, 1099, admitted of the return of followers at all events in the last year of the eleventh century, and, returning *viâ* Lombardy to France, they could put the new idea to the test. The French *langue* was always the most numerous and influential of the Order of St. John.

Twenty-three years ago Dr. Freshfield said: "The history of the influence of the Crusades on Western architecture has yet to be written." So far as I know, this still holds good. Though not taken as a text, the writer of the Paper, with Professor Baldwin Brown, Mr. Bilson, and Mr. Prior, are indirectly gathering data which would help in the realisation of the larger subject; and before long, I hope, if it be not from lack of knowledge I am suggesting what is already done, it will be attempted.

I lean rather to Mr. Moore's views in entertaining admiration for the engineering skill of the perfect Gothic period. Therein was freedom from all classic tradition; weight and bulk gave place to statics. Material was not wasted, *nothing was superfluous*, and herein it is natural architecture, a system of balanced thrusts; but each feature is clothed with grace and beauty. A skeleton, perhaps, in principle, for want of a better word, but a transfigured skeleton, and a thing of beauty never before equalled and never since surpassed. I think Mr. Bond goes rather far in saying "a spire is superfluous." So may be an ambulatory or a chevet, but that hardly affects the question of *modus operandi* when such appendage is resolved on.

M. le-Duc's chronology may not be tenable in every case, as, *e.g.*, in that of Saint-Front, but his deductions are not to be lightly dismissed as out of date, formed as they were by such wide research (too wide, according to M. de Verneilh, who is himself not always correct with dates) by one whom the late Mr. F. B. Hamerton, no mean critic, calls "the most learned, least prejudiced of all architects who ever lived in France." He did not claim for his own country the sole possession of Gothic. On the contrary, M. Saint-Paul accuses him of the belief that his national architecture was not an exclusively French work. M. le-Duc, however, would have affirmed that it was the nursery, though not the cradle, of Gothic, even if one only of the parents of the *nouveau-né* was French.

M. Saint-Paul seems disinclined to admit Italian influence in French Renaissance. I do not know whether he admits Lombardic influence in regard to Gothic, but I think one individual who came thence has not had his share of credit. I refer to the schoolmaster of Avranches, monk of Bec, Abbot of Caen, and Archbishop of Canterbury—the astute Lanfranc, whose advent upset the Saxon ecclesiastical hierarchy of England. A native of Pavia, fond of art, and acquainted with Lombard architecture, he not only used his knowledge to practical purpose on arriving in Normandy, but in his pupils he raised a school of enthusiastic church builders whose work may be seen both there and in England—among others, Abbots Paul of St. Albans, Ernulf and Gundulph of Rochester, and Anselm of Canterbury.* The zeal of William Bonne-Âme, who had been to Jerusalem, and other of his successors, was communicated to districts outside Normandy, and, I believe, extended into Picardy and the Isle of France, combining, however, with local feeling, which differentiated more or less from the original stem, while in Septimanie, Bourgogne, and Austrasie were retained till a much later date Romanesque traditions.

Whether we agree with depreciators of the theory of engineering skill, consciously applied, or whether we oppose that view, it is difficult, in regarding such a pile as Amiens Cathedral, to see in it the product of rule-of-thumb, and when we think of such a lofty vaulted hall as La Sainte Chapelle at Paris, without aisles to form abutment, the highest point that human skill could reach in masonry seems to have been attained in a manner that is really marvellous—I had almost written miraculous. No wonder that before the vault was keyed in the trembling of the piers was such that the workmen fled the district, in the fear that St. Louis would have them put to death, if they were not killed by the fall they felt was certain to ensue. Yet, after 600 years and more, it stands to bear witness to De Monterreau's skill and daring. Like Wren, he needs no other monument than the building he designed to keep his name from oblivion.

I would hardly suggest it was a retrograde movement, but it is noticeable that an important instance exists of a return to the old barrel-vault which was discarded centuries before. In the important Renaissance church built by the Knights of St. John at Valetta (St. John's Cathedral,

* The late Mr. G. E. Street and Mr. Prior have both demurred to a claim on his behalf as *introducer* of Romanesque, and perhaps justly so, as the Roman domination gave the primary suggestion, on to which local tradition and inspiration were grafted with varied results. Yet he may be allowed to have added its most advanced characteristics, and quickened by the impetus of his genius its extension in Western Christendom. Mr. Prior considers that real Gothic began with William of Sens' work at Canterbury Choir. Many of our bishops in the twelfth century were educated at Paris.

Malta), Cassar, the architect, omitted the clerestory, and sprang the pointed barrel-vault of 51 feet span just above the main arcade, the cross walls of the side chapels serving as buttresses. It would be interesting to have details of the construction of this vault. The small chapel of St. Elmo there has a pointed coffered vault in stone.

Mr. Spiers mentions the fluting of pilasters (they are also banded) at Autun and Langres of as late a date as 1140, and agrees with Le-Duc that the idea was derived from Roman remains. At all events, the same feature occurs in Notre Dame de Beaune, Saint-Andoche de Saulieu, the Porch at Cluny, La Charité-sur-Loire, and Saint-Trophime, Arles. Was the fluting in the pilasters at Deerhurst inspired by an unearthed Roman altar or coffin?

Mr. Bond thinks our own is but a small corner of the Romanesque field, but Mr. Bilson thinks it sufficiently important to throw considerable light upon the subject of ribbed-vaulting if the buildings are studied. As to the work in England being of a mixed character, no doubt it is so; but is it really so very different in this respect in France, taking moulding, ornaments, and all the other points before mentioned into account?

There is one thing in Norman vaulting which seems to require adjustment and a verdict, and that is the question how to decide whether a diagonal rib is contemporary or is a later addition, where the moulding of the rib does not betray its anachronism. Professor Willis, in his Paper read before the Institute in 1842, referring to the packing between rib and web (where the top of the one and the surface of the other do not correspond), says that the ribs were set out without reference to the vault, and the curvature of the rib, being intentionally regular, was packed up to fit the groin with stone and rubble, and he says most of it is required at the springing. But if I understand Mr. Bilson aright,* such packing is an indication that the rib has been added later, to strengthen the groin or to embellish the vault. Perhaps someone will explain the difference, or offer surer general tests for deciding whether such rib is an addition, apart from whether the keystone is of the rude lozenge shape or is properly shouldered. Why should not the curve of the rib have been made to correspond with the actual line of groin when first constructed?

In some cases I notice the arris of the extrados of the rib *does* correspond with the groin at its junction with the web on the main axis, but being concentric it cannot touch the web of the collateral intersection, and is necessarily packed to a small extent; and here I have no doubt myself that the ribs *are* contemporary. Of course, in a case like the south aisle of the crypt at Gloucester Cathedral, it is evident from the enlarged responds, the ribs themselves, and the settlement of the work, that the rib is for strengthening only, and was added later, though not at a very long distance of time. If the unribbed vaults here were built in 1089, and these ribs added twenty-six years after as sometimes stated, it would make this the oldest but one in England. Mr. Spiers (p. 293) mentions the rough centering of the vault in the crypt at Tournus, *ante* 1000 A.D. I think at Christchurch, Hants, in one part the planking may be seen *in situ*, but I cannot find my note of it. Perhaps other instances of its marks on the soffit may occur to someone. The pinched-out groins in the crypt at Rochester may have been noticed elsewhere in Norman unribbed vaults, and there may be other places besides Nikosia where pottery is used in rubble vaults of late Norman period.

Although no longer the vogue, and checked in what seemed likely to become universal adoption, it is satisfactory to know that Gothic is being academically studied by experts, and in book knowledge also by students for examination purposes; and our thanks are due to the writer of the Paper and to those who contributed others last year, and it is only with a view of continuing discussion that I set down these notes, as a student who only claims the right to say:

"J'en sais assez pour avoir le droit de dire
Je ne sais pas."

E. W. HUDSON.

* R.I.B.A. JOURNAL, Vol. VI. pp. 203–4.